

**Claims**

What is claimed is:

1     1.     A method of dividing up a communication channel for use in a seismic  
2     acquisition system having M base stations and N sensors, comprising:  
3             dividing up the communication channel into M frequency bands; and  
4             dividing up each frequency band into N+1 time slots.

1     2.     A method of dividing up a communication channel for use in a seismic  
2     acquisition system, comprising:  
3             dividing up the communication channel into time slots including  
4             signaling and status bits, seismic information, and guard time.

1     3.     A method of transmitting information from a sensor to a base station  
2     in a seismic acquisition system, comprising:  
3             listening for an open time slot, frequency, and sector;  
4             requesting use of the available time slot from the base station;  
5             if the base station is operating at full capacity, then reducing the  
6             overall data for the base station; and  
7             if the base station is not operating at full capacity, then capturing the  
8             open time slot and transmitting to the base station.

1     4.     A method of error correction in a communication system for a seismic  
2     acquisition system including a sensor and a base station, comprising:  
3             transmitting data from the sensor to the base station ; and  
4             if the data includes errors, then retransmitting the data.

1     5.     A method of error correction in a communication system for a seismic  
2     acquisition system including a sensor and a base station, comprising:

3 transmitting data from the sensor to the base station; and  
4 if the data includes errors, then requesting retransmission of the data.

1 6. A method of error correction in a communication system for a seismic  
2 acquisition system including a sensor and a base station, comprising:  
3 transmitting data from the sensor to the base station;  
4 if the data includes errors, then retransmitting during non-active time.

1 7. A method of transmitting information in a communication channel in a  
2 seismic acquisition system including a plurality of sensors positioned at  
3 different distance from a base station, comprising:  
4 transmitting information from one of the sensors to the base station;  
5 if the sensor is a nearby sensor, then adjusting the modulation in the  
6 communication channel to increase the data density.

1 8. A method of transmitting information from a sensor to a base station  
2 in a seismic acquisition system having a plurality of communication  
3 channels, comprising:  
4 selecting a channel for transmission from the sensor to the base  
5 station;  
6 if no channels are available, then waiting until a channel is available;  
7 if the selected channel is available, then transmitting the information  
8 from the sensor to the base station;  
9 if the selected channel is impaired, then selecting another channel;  
10 if all of the information has not been properly transmitted, then  
11 adjusting to a lower order modulation and transmitting a  
12 request for retransmission from the base station to the sensor;  
13 and

14 if all of the information has been properly transmitted, then adjusting  
 15 to a lower order modulation and transmitting control  
 16 information from the base station to the sensor.

1 9. A base station for use in a seismic acquisition system, comprising:  
 2 a transceiver;  
 3 one or more diversity antennas; and  
 4 one or more directional antennas.

1 10. A method of selecting an antenna for transmitting information in a  
 2 seismic acquisition system having a plurality of antennas, comprising:  
 3 determining the data density for each antenna;  
 4 selecting the optimum antenna for transmitting information;  
 5 transmitting the information using the selected optimum antenna; and  
 6 subsequently receiving information using the selected optimum  
 7 antenna.

1 11. A seismic acquisition system, comprising:  
 2 one or more sensors adapted to sense conditions and generate signals  
 3 representative of the sensed conditions including a memory for  
 4 storing the signals;  
 5 a base station operably coupled to the sensors for receiving and  
 6 transmitting the signals including a memory for storing the  
 7 signals; and  
 8 a recorder operably coupled to the base station for storing the signals.

1 12. A method of communicating in a seismic acquisition system having  
 2 sensors, base stations and a recorder, comprising:  
 3 storing data in the sensors;

4 transmitting data from the sensors to the base stations;  
5 storing data in the base stations; and  
6 transmitting data from the base stations to the recorder.

1 13. A seismic acquisition system, comprising:  
2 one or more sensors adapted to sense conditions and transmit signals  
3 representative of the sensed conditions;  
4 one or more base stations operably coupled to the sensors adapted to  
5 receive and transmit the signals; and  
6 a recorder operably coupled to the sensors and the base stations  
7 adapted to receive the signals and transmit control information  
8 to the sensors.

1 14. A seismic acquisition system, comprising:  
2 a plurality of rows of sensor stations for sensing conditions and  
3 transmitting signals representative of the sensed conditions;  
4 a plurality of base stations coupled to the rows of sensor stations for  
5 receiving and transmitting the signals; and  
6 a recorder operably coupled to the base stations for receiving the  
7 signals.

1 15. A wireless master sensor station, comprising:  
2 a transceiver for transmitting and receiving information including a  
3 directional antenna;  
4 a control module coupled to the transceiver for monitoring and  
5 controlling the operation of the wireless master sensor station;  
6 and  
7 a sensor module coupled to the control module for sensing conditions  
8 and generating signals representative of the sensed conditions.

1 16. A sensor assembly, comprising:  
2 a wireless master sensor station, including:  
3 a transceiver for transmitting and receiving information  
4 including a directional antenna;  
5 a control module coupled to the transceiver for monitoring and  
6 controlling the operation of the wireless master sensor  
7 station; and  
8 a sensor module coupled to the control module for sensing  
9 conditions and generating signals representative of the  
10 sensed conditions; and  
11 one or more slave sensor stations operably coupled to the wireless  
12 master sensor station, including:  
13 a sensor module sensing conditions and generating  
14 signals representative of the sensed conditions.

1 17. A twisted pair sensor station, comprising:  
2 a sensor coupling module for coupling the sensor station to a wireline  
3 connection;  
4 a control module coupled to the sensor coupling module for monitoring  
5 and controlling the operation of the sensor station; and  
6 a sensor module coupled to the control module for sensing conditions  
7 and generating signals representative of the sensed conditions.

1 18. A sensor assembly, comprising:  
2 a plurality of twisted pair sensor stations operably coupled to one  
3 another, each twisted pair sensor station including:  
4 a sensor coupling module for coupling the sensor station to a  
5 wireline connection;

6 a control module coupled to the sensor coupling module for  
7 monitoring and controlling the operation of the sensor  
8 station; and  
9 a sensor module coupled to the control module for sensing  
10 conditions and generating signals representative of the  
11 sensed conditions.

1 19. A picocell base station, including:  
2 a first cellular transceiver including a first antenna;  
3 a second cellular transceiver including a second antenna;  
4 a third cellular transceiver including a third antenna;  
5 a radio transceiver including a radio antenna;  
6 a control module coupled to the first, second and third cellular  
7 transceivers and the radio transceiver;  
8 a first wireline interface coupled to the control module;  
9 a second wireline interface coupled to the control module; and  
10 a third wireline interface coupled to the control module.

1 20. A picocell, including:  
2 a first group of wireless master sensor stations adapted to collect and  
3 transmit data;  
4 a second group of wireless master sensor stations adapted to collect  
5 and transmit data; and  
6 a picocell base station coupled to the first and second group of wireless  
7 master sensor stations adapted to receive the data from the  
8 wireless master sensor stations and transmit it to an external  
9 device.

1     21.   A seismic acquisition system, comprising:  
2           a plurality of rows of picocells, each picocell adapted to collect and  
3           transmit data; and  
4           a controller coupled to the picocells adapted to control and monitor the  
5           picocells and receive data from the picocells.

1     22.   A method of communicating information between a base station and a  
2     plurality of sensors in a seismic acquisition system, comprising:  
3           dividing the sensors into first and second groups of sensors;  
4           transmitting information from the base station to the first group of  
5           sensors using a first communication channel;  
6           transmitting information from the base station to the second groups of  
7           sensors using a second communication channel; and  
8           transmitting information from the base station to the first and second  
9           groups of sensors using a third communication channel.

1     23.   A method of transmitting packets of information from sensors to a base  
2     station in a seismic acquisition system using a communication channel,  
3     comprising:  
4           dividing the communication channel into a plurality of time slots  
5           including time slots for each of the sensors;  
6           wherein each sensor time slot includes time slots for transmission of  
7           the sensor identification, the sensor status, the information  
8           packet number, the information, and error detection information  
9           for the transmitted information.

1     24.   A seismic acquisition system, comprising:  
2           a plurality of rows of picocells for collecting and transmitting data;  
3           a plurality of multiplexers coupled to the rows of picocells; and

4 a controller coupled to the multiplexers and the picocells for recording  
5 the data, and monitoring and controlling the picocells.

1 25. A seismic acquisition system, comprising:  
2 a first pico cell for collecting and transmitting data;  
3 a second pico cell for collecting and transmitting data;  
4 a multiplexer coupled to the first and second pico cells; and  
5 a controller coupled to the first and second pico cells and the  
6 multiplexer for monitoring and controlling the picocells and  
7 collecting and recording the data.

1 26. A seismic acquisition system, comprising:  
2 a plurality of pico cells having data storage; and  
3 a controller coupled to the pico cells.  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30